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Marine Pelecypoda from the North Alaskan Coast

BY

KUNIGUNDE HÜLSEMANN

Department of Biology, University of Southern California, Los Angeles 7, California

(1 Textfigure)

Introduction

The collection this study is based upon was obtained during a cruise of the LCM RED of the U. S. Coast and Geodetic Survey which in August 1953 travelled along the polar shore of Alaska from Barter Island (near the Alaskan-Canadian border) to Barrow, Alaska. During this cruise a scientific party including N. J. Wilimovsky, H. A. Fehlman, and Charles Horvath was able to occupy a number of hydrographic and collecting stations.

Previous Work

Our first knowledge of marine mollusks from the eastern arctic Alaskan area comes from material collected by the Canadian Arctic Expedition 1913-1918 at several stations along the northern Alaskan coast; a list of the mollusks has been published by Dall (1919). The material under consideration is only the second from that area to reach the hands of scientists. Besides this fact it is believed that the specific value of the collections and their data is that they were gathered in shallow, nearshore waters which are unlikely to be visited by any large-scale oceanographic expedition (see Wilimovsky, 1953).

The Area of Investigation

The area investigated extends in length roughly 500 km. The general character of the sea floor as indicated by the samples is composed of sediments of various grain size without extensive regions of rocks or boulders (see also Mohr, Wilimovsky, & Dawson, 1957; Carsola, 1952.)

The temperatures of the bottom water were negative (-0.8 to -1.35°C) at the (eastern) stations 2 to 11, positive (2.0 to 3.2°C) at the (western) stations 12 to 18, which group was taken in relatively shallower water. Possibly the positive temperatures indicate the presence of Bering Sea water. The decrease of the salinity reflects also the decrease of the water depth. In the adjacent Beaufort Sea, the currents are in a clockwise eddy. Close to shore, there exists a counter eddy which is indicated by the pattern of deposits at ends of islands.

The Stations

All dredging stations are located relatively close to shore in shallow water (Fig. 1). The depths extend from 3.65 m. down to almost 23 m. (station 5).

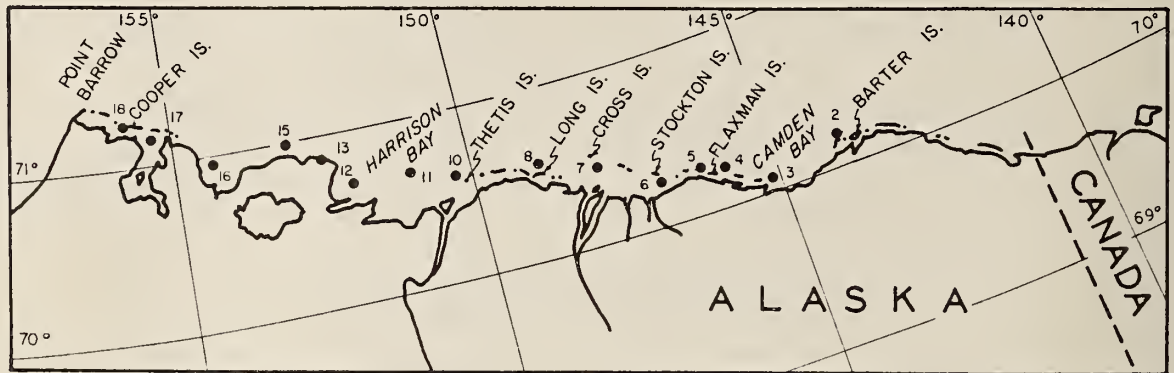


Figure 1: Dredging Stations of the LCM RED along the Arctic Coast of Alaska

The Pelecypoda reported here are part of the samples which were taken with a small biological dredge. The 15 stations are listed in Table 1 (from Wilimovsky, 1953). Stations 1, 9, and 14 are shore stations, at which no mollusks have been collected, and are therefore omitted. The following details are added to the original data listed in Table 1: Gravel was present in the samples of the stations 3, 4, 5, 6, 11, 12, 15, 17, 18. Clay was found also in station 3.

The Species Collected

In these 15 stations at least 12 species of pelecypods were collected. They have all been reported previously as inhabitants of arctic

waters. The findings contribute to our knowledge of the species and their occurrence eastward beyond Point Barrow.

Table 2 is a list of the species collected. Also listed is their general distribution combined mainly from MacGinitie (1959), Soot-Ryen (1932), Hägg (1904), and Stuxberg (1882, 1887).

Shells of the arctic species are subject to marked variation. Pelecypods particularly mentioned by MacGinitie as highly variable are *Musculus*, *Astarte*, and *Liocyma*; species of these genera are found in the present collection. Among the variables are color of the shell, texture of the periostracum, the dimensions of the shell and their proportions.

Table 1. The Dredging Stations of the LCM RED Cruise Where Pelecypods Were Obtained

Station	Locality	Longitude West	Latitude North	Date Aug. 1953	Depth in ¹	Sediment type	Temperature °C ²	Salinity ‰ ²
2	North of Arey Island	143° 54'	70° 08'	9	10.70	sand	-1.18	30.52
3	Off Kangigivik Point	145° 14'	70° 03'	9	7.30	sand	-0.8	30.01
4	Off Brownlow Point	145° 55'	70° 12'	10	12.80	? sand	-1.3	30.61
5	West of Flaxman Island	146° 15'	70° 11'	10	22.80	sand and mud		
6	South East Stockton Islands	146° 50'	70° 15'	10	4.60	sand and mud	-0.9	27.88
7	South of Cross Island	147° 55'	70° 26'	10	7.30-8.25	gravel	-1.0	30.25
8	North of Long Island	148° 50'	70° 31'	10	12.80	muddy clay	-1.35	29.76
10	Off Thetis Island	150° 15'	70° 34'	11	7.30	sand; clay	-0.8	30.30
11	East Harrison Bay	150° 59'	70° 43'	11	8.25	clay; sand	-1.0	29.94
12	Off Atigaru Point	151° 50'	70° 40'	11	4.60	sand	3.2	25.66
13	15 miles East of Pitt Point	152° 25'	70° 53'	11	6.40	clay	2.0	28.82
15	North West of Pitt Point	153° 15'	70° 57'	12	7.30	mud	3.2	26.78
16	Smith Bay	154° 16'	70° 57'	12	6.10	sandy clay	2.5	27.52
17	Sanigaruak Pass, Elson Lagoon	155° 24'	71° 11'	12	3.65-6.40	clay	2.8	21.96
18	Elson Lagoon, S. W. of Cooper Isl.	155° 48'	71° 13'	12	3.65	sand; clay	2.5	24.33

¹ originally in feet

² data only for the bottom water

The color is a very unreliable specific characteristic. It varies individually; one predominant tone in all individuals throughout one sample indicates that it also depends on the immediate surrounding substrate.

The collecting data confirm the live occurrence of all the species collected in shallow water.

Shells drilled by *Natica* or *Polinices* (from MacGinitie, 1959) were rather frequent. Numerous holes of this sort were found in *Cyrtodaria kurriana* and *Yoldia arctica*.

Geographical Distribution

As mentioned above all species were reported earlier as members of the arctic fauna. With the exception of *Yoldia myalis*, their distribution is circumpolar; further, most of them occur also in subarctic or boreal areas.

The findings of *Yoldia myalis*, the distribution of which is considered to be discontinuous between the eastern and the western north American coasts (Ockelmann, 1954), narrow

the gap between Point Barrow and the Hudson Strait. *Pandora glacialis* has not been recorded previously from the western part of the arctic seas of North America (Soot-Ryen, 1932). Dall (1919) listed *Pandora* sp. (fragments) from off Collinson Point. The finding of three intact specimens of *P. glacialis* in the RED collection indicates that the range of the species also includes the north Alaskan coast.

It is interesting to note that there are distinct differences from some of MacGinitie's findings (1959) on the marine mollusks from the area west of Point Barrow. Striking is the different number in which some species occur in the RED collection compared with that of MacGinitie. The most abundant species in the RED collection is *Yoldia arctica* of which 424 intact specimens were counted plus an additional large number of valves; MacGinitie found only one specimen. *Cyrtodaria kurriana* is quite frequent in the RED material although the majority of the specimens are empty. It is in striking contrast that the species was not found in the extensive collection of G. E. MacGinitie from west of Point Barrow. Still, *C. kurriana* was recorded in the Chukchi Sea (after Ushakov,

Table 2. The Pelecypods of the LCM RED Collection and Their General Distribution

	East Siberian Sea	Chukchi Sea	West Pacific	Bering Strait	East Pacific	West of Barrow	Point Barrow	East of Barrow	Canadian North Coast	West Atlantic	Greenland	Iceland	Spitsbergen	Barents Sea	East Atlantic	Murnan Coast	Novaja Semlja	Kara Sea
<i>Nucula tenuis</i>	+	+	+ ¹	+	+ ⁹	+	+	+	+	+ ¹²	+	+	+	+	+ ¹⁶	+	+	+
<i>Yoldia arctica</i>	+	+		+		+	+	+	+	+ ¹⁰	+	+	+	+	+ ¹³	+	+	+
<i>Yoldia myalis</i>		+		+	+ ⁶	+	+	+		+ ¹⁰								
<i>Musculus niger</i>	+	+	?	+	+ ⁷	+	+	+	+	+ ¹²	+		+		+ ¹³	+	+	+
<i>Pandora glacialis</i>	+	+		+	+ ⁵			+		+ ¹⁰	+		+	+		+	+	+
<i>Lyonsia arenosa</i>	+	+	+ ¹	+	+ ²			+	+	+ ¹⁰	+		+			+	+	+
<i>Astarte borealis</i>	+	+	+ ¹	+	+ ³	+	+	+	+	+ ¹⁰	+	+			+ ¹⁴		+	+
<i>Astarte montagui</i>	+	+		+	+ ⁴	+	+	+	+	+ ¹⁰	+	+	+		+ ¹⁵			
<i>Liocyma fluctuosa</i>	+	+	+ ¹	+	+ ²	+	+	+	+	+ ¹⁰	+	+	+	+		+	+	+
<i>Macoma calcarea</i>	+	+	+ ¹	+	+ ⁸	+	+	+	+	+ ¹¹	+	+	+	+	+ ¹⁴	+	+	
<i>Macoma moesta</i>	+	+	+ ¹	+	+ ⁸	+	+	+	+		+		+	+			+	+
<i>Cyrtodaria kurriana</i>	+	+		+				+			+						+	+

The superior numbers stand for localities which represent the southernmost finding of the particular species.

Key to numbers: ¹ Japan; ² Kodiak Island; ³ Prince William Sound; ⁴ British Columbia; ⁵ Strait of Juan de

Fuca; ⁶ Puget Sound; ⁷ Oregon; ⁸ Monterey Peninsula, California; ⁹ Coronados Islands, Mexico;

¹⁰ Massachusetts; ¹¹ Long Island, New York; ¹² Cape Hatteras, North Carolina;

¹³ Scotland; ¹⁴ Denmark; ¹⁵ Bay of Biscay; ¹⁶ Mediterranean Sea.

1952) and on the Chukchi Peninsula (Leche, 1883), and was mentioned in a few stations of the Canadian Arctic Expedition: at Port Clarence near Teller (Seward Peninsula), Alaska; at Spy Island off the north Alaskan coast; and other stations (Dall, 1919). *Hiatella arctica*, in turn, which was the most abundant and most nearly ubiquitous species in MacGinitie's collection, was lacking in the RED material. Another species, that was rather frequent in the collections west of Point Barrow, is *Nucula tenuis*; only two damaged valves were in the RED collection.

Acknowledgment

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Systematic Section

Nomenclature and taxonomy of the pelecypods are used as by MacGinitie (1959).

NUCULIDAE

Nucula tenuis (MONTAGU, 1808)

Only 2 left valves and some fragments were taken at stations 8 and 11. The valve in station 11 is 10.7 mm. in length; the height could not be measured exactly, since the umbo was broken away, but might have been about 8 mm.

These specimens belong to the var. *expansa* Reeve. The color of the periostracum is olive, the growth lines are brown and prominent. *Nucula tenuis* var. *expansa* seems not to be rare in other places. In MacGinitie's collection (1959) it was one of the species occurring in numbers. Dall (1919) did not list it from the area under investigation.

This is the first record of the species on the northern Alaskan coast. The distribution is circumarctic and circumboreal.

NUCULANIDAE

Yoldia arctica (GRAY, 1824)

Yoldia arctica was the most abundant species in the collection; 424 intact specimens, 2 dead, 257 right, 205 left valves were counted.

The species was present in every station, in greatest numbers in station 6 (179 living, 15 right, 13 left valves) and station 11 (96 living, 196 right, 151 left valves). In stations 7, 12, and 15 were only single valves.

The two largest living specimens (of 75 measured) are 14.8 mm. in length by 9.0 mm. in height by 5.6 mm. in breadth and 13.5 mm. by 8.1 mm. by 4.3 mm.; the two smallest living specimens were 3.7 mm. in length by 2.6 mm. in height by 1.7 mm. in breadth and 3.9 mm. by 2.5 mm. by 1.7 mm. The largest single shells were 17.3 mm. by 10.1 mm. and 14.5 mm. by 9.6 mm. The ratio height/length (H/L) of 74 specimens varied from 0.57 to 0.74, with a peak in the range of 0.63 to 0.68. The ratio breadth/length (B/L) varied in 54 specimens from 0.32 to 0.48. In 16 specimens there were 13 to 16 anterior (f) and 10 to 13 posterior (b) hinge teeth the ratio f/b of which being 1.14 to 1.33.

Most of the specimens belong to the typical form and the var. *siliqua* Reeve with transitional forms. Some come very close to *Yoldia collinsoni* (syn. *Leda* (*Portlandia*) *collinsoni* Dall, 1919), from off Collinson Point, arctic Alaskan coast. In these the ratios H/L and B/L correspond to the dimensions in the description of Dall, three specimens are even a little stouter, whereas the size of the shells is somewhat larger (10.0 mm. and more in length; Dall: 8.5 mm.). The ratio of the anterior to the posterior hinge teeth (f/b) of *Yoldia collinsoni* is, according to Dall's description, with 1.37 a little higher than in the RED specimens. Here are compared the proportions of the shells rather than the plain measurements, a method Ockelmann (1954) used when revising some other arctic species of the genus. Between the shells of both, *Y. arctica* and *Y. collinsoni*, is a continuous transition from elongate to stout forms. It is therefore proposed not to retain *Y. collinsoni* as a valid species.

The color of the periostracum is highly variable in the specimens in the collection. All gradations of color from greyish brown and yellowish tan to olive black are found. All of the shells show marked growth cessation lines. Usually the living specimens in one station are quite uniform in color, also often in size and shape. This observation is true especially for *Yoldia arctica* and *Liocyma fluctuosa*. This fact points to an immediate strong relationship of the animals to the local living conditions. The finding in great numbers is in contrast to the one specimen found by MacGinitie. Many single shells are drilled.

Yoldia myalis (COUTHOUY, 1838)

Forty-nine intact specimens, 16 right and 20 left valves were found in stations 10, 11, 12, 16, and 18, whereof 25 living specimens and 11 right and 12 left valves came from station 10 alone.

The largest specimen (of 25) measures 11.6 mm. in length by 7.1 mm. in height by 4.3 mm. in breadth. The smallest is 9.0 mm. by 5.7 mm. by 3.3 mm. The ratio H/L in 25 specimens is 0.54 to 0.68 with a distinct maximum in the range of 0.57 to 0.64; B/L in 20 specimens is 0.33 (0.30) to 0.39 (0.41). In 5 specimens the anterior hinge teeth are 12 to 15, and the posterior hinge teeth 10 to 12; the ratio f/b in 5 specimens is 1.1 to 1.3.

The proportion H/L Ockelmann (1954) gave for *Yoldia myalis* is 0.52 to 0.55, which means, that his specimens were more slender; however, the ratio from measurements of Couthouy (1838) is within the variation of the RED animals. The ratio f/b fits the numbers of Ockelmann. Apparently the specimens from the arctic Alaskan coast are considerably smaller than those found in other areas.

The color varies from nearly ocher yellow to dark olive brown. As in *Yoldia arctica* all living specimens in one station are almost uniformly colored and of similar size. Growth cessation lines are more distinct in the darker shells.

The recent occurrence of *Yoldia myalis* was recorded only from the east and west coast of North America and not yet known between Point Barrow and Hudson Strait, wherefore Ockelmann suggested it should be considered discontinuous. The findings in this collection extend the known range for some 250 kilometers eastward from Point Barrow.

MYTILIDAE

Musculus niger (GRAY, 1824)

Only one intact juvenile specimen of 3 mm. length at station 6, one empty shell of 7.6 mm. length at station 3, and a few single shells (the longest one 10.5 mm.) and fragments were taken at stations 3, 6, and 16. At station 7 two tiny *Musculus* sp. of less than 1 mm. length have a light olive color.

The color of the empty shell is brownish olive becoming darker on the margin.

The species is circumarctic and circum-boreal.

PANDORIDAE

Pandora glacialis LEACH, 1819

Three intact specimens were taken at the stations 4, 8, 11, and five right and 4 left valves at station 3, 8, 11, 15. The largest living specimen is 17.2 mm. in length by 10.0 mm. in height; the posterior dorsal margin from the umbo to the posterior end 10.5 mm. The largest single shell (left) is 21.0 mm. in length by 13.2 mm. in height; the posterior dorsal margin 13.9 mm. Probably the specimens belong to the typical form.

The shells of *Pandora glacialis* have exceedingly thin margins. The younger valves are transparent. Some of the valves have been drilled.

This species was not found in the collection of MacGinitie (1959). Dall (1919) recorded *Pandora* sp. from off Collinson Point. The three intact specimens in this collection prove the presence of the species in the western part of the arctic coast of North America for the first time.

LYONSIIDAE

Lyonsia arenosa (MÖLLER, 1842)

One empty pair of valves was collected at station 16; 20 right and 20 left valves were present in stations 8, 10, 11, 12, 15, 16, 17. The largest valve (left) measures 21.0 mm. in length by 12.5 mm. in height.

This species was not in the collection of MacGinitie (1959), who found *Lyonsia norvegica* which, in turn, was not present in the RED material.

Dall (1919) listed *Lyonsia arenosa* at two stations on the north Alaskan coast. It is circumarctic and circumboreal.

ASTARTIDAE

Astarte borealis (SCHUMACHER, 1817)

Occurring at all but two stations, 22 intact specimens, 18 empty valves, 13 right and 27 left valves plus additional fragments were dredged. The largest intact specimen is 26.5 mm. in length by 17.1 mm. in height by 7.3 mm. in breadth. The largest valves taken dead are 35.2 mm. by 28.8 mm. by 11.2 mm. and 34.9 mm. by 28.4 mm. by 9.1 mm. The largest single shell is 38.0 mm. by 29.2 mm.

The shell of *Astarte borealis* shows great variation in the proportion of the length to the height, and the general shape. Most specimens represent the strongly compressed and elongate form (Figs. 1d and 1e in Plate 4; Jensen, 1912; and Figs. 5 and 6, Plate 22; MacGinitie, 1959). The sculpture of the shell is rather smooth, or, more often, has distinct concentric folds around the umbones. Usually the transition from the folds to fine lines is abrupt. The thick periostracum varies from dark brown to black; often it becomes lighter brown and thinner near the umbones. The umbones are often eroded. Some shells have, as MacGinitie also mentions, a rustlike deposit or concretion on the shell, especially on the anterior end.

Also a number of smaller shells of less than 8 mm. length was found. They are distinctly thinner, and the periostracum is much lighter in color. Even some of these younger specimens have eroded umbones.

A number of the dead shells was closed tightly as if alive, and some of them were filled with mud as mentioned by MacGinitie (1959).

Astarte borealis is circumpolar and circumboreal.

Astarte montagui (DILLWYN, 1816)

Astarte montagui is the third most frequent species in the RED collection; 110 intact, 2 dead specimens, and 26 right and 24 left valves were found in eight stations. In stations 3 and 4 alone were 100 intact animals taken. The largest living specimen measures 19.0 mm. in length by 17.4 mm. in height by 6.0 mm. in breadth. Only very few large shells were present; most are about 10 mm. long.

Astarte montagui exhibits great variation in shape, sculpture, and color. Jensen (1912) separated the varieties of the species by the statistical method; between these exist all transitional forms. Most of the specimens in the collection can be assigned to the varieties *striata*, *fabula*, and *warhami*. Fine, evenly spaced concentric lines around the umbones vary in spacing and prominence. The color of the young shells is yellowish tan, lighter near the umbones, and of the larger living ones, chestnut brown. The larger dead ones lack the chestnut tint. Some have a black concretion near the dorsal margin.

MacGinitie found *Astarte montagui* to be one of the most abundant species west of Point Barrow.

Astarte montagui is here recorded for the first time from the arctic Alaskan coast east of Point Barrow.

It is a circumarctic and circumboreal species.

TAPETIDAE

Liocyma fluctuosa (GOULD, 1841)

Liocyma fluctuosa was the second most frequent species in the RED collection; 206 intact, 11 dead specimens, 49 right and 36 left valves were counted. The species was present in all but one of the stations. The greatest number of living specimens (85) came from station 3.

The largest living shell is 16.0 mm. long by 12.2 mm. high; the smallest is 3.5 mm. long. The largest single shells are (2 left valves) 27.5 mm. in length by 18.6 mm. in height and 21.7 mm. by 16.0 mm.; and (1 right valve) 25.5 mm. by 17.8 mm. These three large single shells have a relatively thick periostracum of yellow or brownish, respectively. They are shaped exactly like the *Liocyma viridis* Dall.

MacGinitie (1959) considers five other species (*Liocyma beckii*, *L. scammoni*, *L. viridis*, *L. aniwana*, *L. schefferi*) as variants of *L. fluctuosa*. The many specimens of *L. fluctuosa* in the RED collection confirm her finding that the young specimens tend to be more trigonal than larger specimens. Here are by far more small than large specimens.

The smallest shell is transparent (3.5 mm. in length). The color of the other living shells is ivory white with grey, yellow or greenish tint. The concentric sculpture is more or less evenly spaced. In old as in young specimens the umbones are usually worn.

Liocyma fluctuosa occurs in all arctic seas and is also circumboreal.

TELLINIDAE

Macoma calcarea (GMELIN, 1791)

[in a number of other papers quoted as (CHEMNITZ, 1782); Neues System. Conchyl. Cabinet 6]

Only one right and one left valve were found at stations 5 and 11. The one large (left) shell is 36.0 mm. in length by 23.6 mm. in height. Some fragments of a *Macoma* sp. were also at stations 6, 8, 10, 12.

MacGinitie (1959) mentioned Macoma calcaria as one of the three most abundant species in the collection west of Point Barrow occurring in extremely sticky mud. The bottom at the stations 5 and 11 contained also mud and clay.

Macoma calcaria is found throughout the arctic; it is also circumboreal.

Macoma moesta (DESHAYES, 1854)

Three intact specimens, 2 right and 4 left valves were found in station 2, 3, 11, 12, 16.

The largest living specimen is 19.2 mm. long by 13.6 mm. high. Usually the brittle shell of Macoma moesta is damaged and does not permit an exact measuring. The relatively thin periostracum extends onto the interior surface.

Along the posterior end and the ventral margin there is a brownish concretion as mentioned by MacGinitie (1959).

Macoma moesta occurs throughout the arctic seas; it is also circumboreal.

MYACIDAE

Mya spec.

The beak areas of three Mya sp. were found in stations 4, 7, and 12. They have been worn considerably.

SAXICAVIDAE

Cyrtodaria kurriana DUNKER, 1862

Rather frequent species in the RED collection; 16 intact, 75 dead specimens, 32 right and 28 left valves were taken in stations 5, 6, 7, 10, 11, 12, 17, 18. The longest living shell is 22.0 mm., the longest dead shell is 29.3 mm., the longest single valve is 31.7 mm. in length. Many of the dead shells are drilled.

Cyrtodaria kurriana was not found in MacGinitie's (1959) collection. This surprises since most of the shells in the RED collection came from stations 17 and 18 which are the closest to Point Barrow. The distribution is circum-polar although C. kurriana is not yet found in all arctic waters and not at every locality alive.

MacGinitie found Hiatella arctica (Linnaeus) (also fam. Saxicavidae) to be the most abundant bivalve; not a single specimen was present in the RED collection.

Summary

The collection on hand was dredged during a cruise of the U. S. Coast and Geodetic Survey LCM RED along the north Alaskan coast between Barter Island and Point Barrow. Twelve species of pelecypods were taken which have been known from arctic seas. For four of them this is the first record in the area of investigation.

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